

State of California  
AIR RESOURCES BOARD

EXECUTIVE ORDER D-140-11  
Relating to Exemptions under Section 27156  
of the Vehicle Code

SPEARCO PERFORMANCE PRODUCTS, INC.

AIR-TO-AIR INTERCOOLER SYSTEM

Pursuant to the authority vested in the Air Resources Board by Section 27156 of the Vehicle Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-45-5;

IT IS ORDERED AND RESOLVED: That the installation of the air-to-air intercooler system manufactured by Spearco Performance Products, Inc. has been found not to reduce the effectiveness of required motor vehicle pollution control devices and, therefore, is exempt from the prohibitions of Section 27156 of the Vehicle Code for 1985-1986 model-year 2.3 liter Ford Merkur vehicles with OEM turbochargers.

This Executive Order is valid provided that installation instructions for this device will not recommend tuning the vehicle to specifications different from those submitted by the device manufacturer.

Changes made to the design or operating conditions of the device, as exempted by the Air Resources Board, that adversely affect the performance of a vehicle's pollution control system shall invalidate this Executive Order.

Marketing of this device using an identification other than that shown in this Executive Order or marketing of this device for an application other than those listed in this Executive Order shall be prohibited unless prior approval is obtained from the Air Resources Board. Exemption of a kit shall not be construed as an exemption to sell, offer for sale, or advertise any component of a kit as an individual device.

This Executive Order does not constitute any opinion as to the effect that the use of this device may have on any warranty either expressed or implied by the vehicle manufacturer.

THIS EXECUTIVE ORDER DOES NOT CONSTITUTE A CERTIFICATION, ACCREDITATION, APPROVAL, OR ANY OTHER TYPE OF ENDORSEMENT BY THE AIR RESOURCES BOARD OF ANY CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF THE SPEARCO AIR-TO-AIR INTERCOOLER SYSTEM FOR 1985-1986 MODEL-YEAR 2.3 LITER FORD MERKUR VEHICLES WITH OEM TURBOCHARGERS.

No claim of any kind, such as "Approved by Air Resources Board" may be made with respect to the action taken herein in any advertising or other oral or written communication.

Section 17500 of the Business and Professions Code makes untrue or misleading advertising unlawful, and Section 17534 makes violation punishable as a misdemeanor.

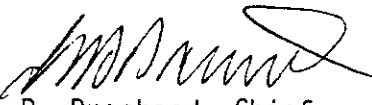
Section 43644 of the Health and Safety Code provides as follows:

"43644. (a) No person shall install, sell, offer for sale, or advertise, or, except in an application to the state board for certification of a device, represent, any device as a motor vehicle pollution control device for use on any used motor vehicle unless that device has been certified by the state board. No person shall sell, offer for sale, advertise, or represent any motor vehicle pollution control device as a certified device which, in fact, is not a certified device. Any violation of this subdivision is a misdemeanor."

Any apparent violation of the conditions of this Executive Order will be submitted to the Attorney General of California for such action as he deems advisable.

Executive Order No. D-140-8, dated September 17, 1985, is superseded and of no further force and effect.

Executed at El Monte, California, this 17<sup>th</sup> day of December, 1985.

  
K. D. Drachand, Chief  
Mobile Source Division

State of California  
AIR RESOURCES BOARD

EVALUATION OF SPEARCO PERFORMANCE PRODUCTS, INC.'S AIR-TO-AIR INTERCOOLER  
SYSTEM FOR EXEMPTION FROM THE PROHIBITIONS IN VEHICLE CODE SECTION 27156 IN  
ACCORDANCE WITH SECTION 2222, TITLE 13, OF THE CALIFORNIA ADMINISTRATIVE CODE.

December, 1985

Issue Date: December, 1985

Evaluation of Spearco Performance Products, Inc.'s Air-To-Air Intercooler System for Exemption from the Prohibitions in Vehicle Code Section 27156 in Accordance with Section 2222, Title 13, of the California Administrative Code.

by

Mobile Source Division

State of California  
Air Resources Board  
9528 Telstar Avenue  
El Monte, CA 91731

(This report has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.)

## SUMMARY

Spearco Performance Products, Inc. has requested an update to the existing Air Resources Board's (ARB) Executive Order (E.O.) D-140-8. Under E.O. D-140-8, their air-to-air intercooler system was exempted from the prohibitions of California Vehicle Code Section 27156 for use on the 1985 model-year 2.3 Liter Ford Merkur vehicles with original equipment manufacturer (OEM) turbochargers. The request is to include 1986 model-year 2.3 liter Ford Merkur turbocharged vehicles in the exemption also.

Based on previous comparative tests evaluating the exhaust emission effects of several add-on intercooler kits and the staff's engineering evaluation of the intercooler's impact on exhaust emissions from turbocharged vehicles, the staff concludes that Spearco's air-to-air intercooler kit will not adversely affect exhaust emissions from vehicles for which exemption is requested.

The staff recommends that Spearco Performance Products, Inc. be granted an exemption for their air-to-air intercooler system as requested and that Executive Order D-140-11 be issued.

## CONTENTS

### Page Number

<u>SUMMARY</u>	i
<u>CONTENTS</u>	ii
I. <u>INTRODUCTION</u>	1
II <u>CONCLUSION</u>	1
III <u>RECOMMENDATIONS</u>	1
IV. <u>INTERCOOLER SYSTEM DESCRIPTION AND OPERATION</u>	1
V. <u>DISCUSSION</u>	2

Evaluation of Spearco Performance Products, Inc.'s Air-to-Air Intercooler System for Exemption from the Prohibitions in Vehicle Code Section 27156 in Accordance with Section 2222, Title 13, of the California Administrative Code.

I. INTRODUCTION

Spearco Performance Products, Inc. has requested an update to the existing Air Resources Board's (ARB) Executive Order (E.O.) D-140-8. Under E.O. D-140-8 their air-to-air intercooler system was exempted from the prohibitions in California Vehicle Code Section 27156 for use on the 1985 model-year 2.3 Liter Ford Merkur vehicles with OEM turbochargers. The request is to include 1986 model-year 2.3 liter Ford Merkur turbocharged vehicles in the exemption also.

II. CONCLUSIONS

Based on the following: (1) previous comparative tests evaluating the exhaust emission effects of several add-on intercooler kits; (2) the 1986 model-year vehicles for which the exemption update has been requested are carry-overs from 1985 model-year; (3) the staff's engineering evaluation of the intercooler's impact on exhaust emissions from turbocharged vehicles; the staff concludes that Spearco's air-to-air intercooler kit will not adversely affect exhaust emissions from vehicles for which exemption is requested.

III. RECOMMENDATIONS

The staff recommends that Spearco Performance Products, Inc. be granted an exemption update for their air-to-air intercooler system and that Executive Order D-140-11 be issued.

IV. INTERCOOLER SYSTEM DESCRIPTION AND OPERATION

The purpose of the intercooler is to reduce the temperature of the intake air/fuel charge going into the turbocharged engine. This reduction in

the intake charge temperature allows a higher charge density (more amount of air per minute flowing through the engine) which means more fuel into the engine at a given intake manifold vacuum/pressure.

The major components of the Spearco air-to-air intercooler system are a heat exchanger and inter-connecting mandrel bent tubes. They are packaged with installation hardware and instructions and sold as a kit.

The air-to-air heat exchanger is located in such a way that the heated charge air flow goes through one section and ambient air flows through the other section, cooling the heated, compressed charge air. The cooled compressed air is then passed out of the heat exchanger to the intake manifold for induction into the engine.

#### V. DISCUSSION

Spearco's air-to-air intercooler system is similar in design concepts and principles as another manufacturer's systems that have been exempted by the Air Resources Board. Performance analyses have been previously submitted to the ARB indicating the typical thermal efficiency of a turbocharger intercooler system ranges between 40% and 84%. Based on predicted efficiency of a heat exchanger on previous air temperature measurements of two exempted intercoolers installed and tests on two vehicles and a review of the device theory of operation, the staff has concluded that the use of an intercooler would not adversely affect vehicle emissions or result in the degrading of a vehicle's driveability.

In addition, it is the staff's opinion that the combustion temperature will be reduced as a result of cooler intake charge with use of the air-to-air intercooler system. This reduction in combustion temperature will reduce the formation of NOx gases in the combustion chamber, resulting in less NOx emissions through the exhaust system.